

# Infants Prefer the Musical Meter of Their Own Culture: A Cross-Cultural Comparison

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Infants prefer native structures such as familiar faces and languages. Music is a universal human activity containing structures that vary cross-culturally. For example, Western music has temporally regular metric structures, whereas music of the Balkans (e.g., Bulgaria, Macedonia, Turkey) can have both regular and irregular structures. We presented 4- to 8-month-old American and Turkish infants with contrasting melodies to determine whether cultural background would influence their preferences for musical meter. In Experiment 1, American infants preferred Western over Balkan meter, whereas Turkish infants, who were familiar with both Western and Balkan meters, exhibited no preference. Experiments 2 and 3 presented infants with either a Western or Balkan meter paired with an arbitrary rhythm with complex ratios not common to any musical culture. Both Turkish and American infants preferred Western and Balkan meter to an arbitrary meter. Infants' musical preferences appear to be driven by culture-specific experience and a culture-general preference for simplicity.

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Enhanced responsiveness to familiar structures begins in utero and continues throughout life. Young infants tend to prefer the structures of their own culture, such as their native language (Moon, Panneton, Cooper, & Fifer, 1993), and faces of their own race (Bar-Haim, Ziv, Lamy, & Hodes, 2006; Kelly et al., 2005) or species (Pascalis, de Haan, & Nelson, 2002). Newborns also prefer specific stimuli, such as mother's voice (DeCasper & Fifer, 1980; Kisilevsky et al., 2003), face (Field, Cohen, Garcia, & Greenberg, 1984; Pascalis, DeSchonen, Morton, Deruelle, & Fabre-Grenet, 1995), and smell (Marlier, Schaal, & Soussignan, 1997; Marlier, Schaal, & Soussignan, 1998; Sullivan, Wilson, & Toubas, 1994); specific tastes encountered in utero (Menella, Jagnow, & Beauchamp, 2001; Mennella, Kennedy, & Beauchamp, 2006); and specific stories read aloud during pregnancy (DeCasper & Spence, 1986).

Music is a universal and culture-specific stimulus that is typically heard prior to birth (Kisilevsky, Hains, Jacquet, Granier-Deferre, & Lecanuet, 2004), yet little is known about infants' preferences for familiar musical structures. Young infants and fetuses have been shown to respond differentially to specific songs after prolonged exposure. For example, after repeated exposure to a specific piece of music (such as Brahms's Lullaby or the theme song from mother's favorite television show), both fetuses (Kisi-

levsky et al., 2004) and newborns (Hepper, 1991) exhibit subsequent changes in heart rate and movement upon hearing the familiar song. Similarly, after being repeatedly exposed to a specific folk song during the weeks prior to testing, infants discriminate a familiar from an unfamiliar folk song (Plantinga & Trainor, 2005; Saffran, Loman, & Robertson, 2000; Trainor, Wu, & Tsang, 2004). To date, however, it is not known whether infants exhibit familiarity preferences for global aspects of music, such as culture-specific genres or styles of music.

For most human listeners, it is natural and effortless to tap, clap, or dance to music. Movement to music is ubiquitous and does not require formal music training, but it does depend on a listener's capacity to infer the meter. Meter is experienced as a series of beats organized at multiple hierarchical levels, with each level containing intervals of time that are multiples or subdivisions of other levels (Lerdahl & Jackendoff, 1983). Metrical structure in music varies cross-culturally. In most Western music, meter is simple and regular, with metrical beat levels that contain even divisions of time and sequential intervals related by ratios such as 1:1 and 2:1. By contrast, many cultures in South Asia, Africa, the Middle East, and Eastern Europe have meters that are complex and irregular, with uneven subdivisions of time resulting in ratios such as 3:2. For example, both regular and irregular meters can be observed in Balkan music from Bulgaria, Macedonia, and Turkey (London, 1995; Rice, 1994). Irregular meters are perceived and produced inaccurately by Western listeners, who tend to assimilate them toward simpler, more familiar patterns (Collier & Wright, 1995; Povel, 1981; Repp, London, & Keller, 2005; Snyder, Hannon, Large, & Christiansen, 2006). Recent evidence suggests that North American, but not Bulgarian or Macedonian, adults have difficulty detecting temporal disruptions within complex, irregular metrical contexts typical of Balkan music, suggesting that culture influences meter perception. Although infants and even newborns

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can infer meter from simple auditory patterns (Hannon & Johnson, 2005; Phillips-Silver & Trainor, 2005; Winkler, Haden, Ladinig, Sziller, & Honing, 2009), North American infants do not exhibit culture-dependent processing asymmetries until 12 months, which implies that infants' discrimination abilities are culturally unbiased prior to 1 year of age (Hannon & Trehub, 2005a, 2005b). It is nevertheless possible, however, that infants prefer to listen to the music of their own culture, even if they exhibit comparable discrimination abilities for familiar and foreign structures. After all, newborns show listening preferences for their native language long before they show language-specific asymmetries in discrimination (Moon et al., 1993; Nazzi & Ramus, 2003; Werker & Tees, 1999). Evidence of early preferences for familiar music could have important perceptual, cognitive, and social implications for understanding the development of musical and cultural knowledge.

In three experiments, we examined whether infants with different cultural backgrounds would exhibit culture-specific preferences for musical sequences on the basis of meter. We used a preferential looking paradigm to compare responses of North American and Turkish infants to pairs of melodies that had contrasting meters but were otherwise matched for pitch structure and tempo. We used three different types of meter: an isochronous meter with simple Western (2:1) rhythmic ratios, a non-isochronous meter with complex Balkan (3:2) rhythmic ratios, and an arbitrary non-isochronous meter containing alternating and highly complex ratios (such as 7:4 and 8:3) not known to occur in any culture. If cultural experience influences infants' early musical preferences, we expected to find differences in preferential listening patterns of American and Turkish infants.

### Experiment 1: Western and Balkan Meters

We first examined listening preferences of American and Turkish infants for melodies having Western or Balkan meters. In line with prior work on music preferences (Plantinga & Trainor, 2005; Saffran et al., 2000; Trainor, Tsang, & Cheung, 2002; Trainor et al., 2004; Zentner & Kagan, 1996), we used a preferential listening paradigm in which two contrasting musical excerpts are presented with a single visual stimulus and looking times to the visual stimulus are measured. Because there is no prior familiarization or habituation, differential responding is presumed to arise from infants' experiences before participating in the study. In comparable studies examining preferences for familiar languages or faces, infants typically focus their attention longer to familiar stimuli (Bar-Haim et al., 2006; Kelly et al., 2005; Moon et al., 1993). We therefore expected American infants to prefer Western to Balkan meter, because music in North America is dominated by simple isochronous meters. Turkish infants provide an interesting comparison group, because Turkish music contains both isochronous and non-isochronous meters. Thus, infant listeners from this "bimusical" environment might be expected to show equal preference for Western and Balkan meters, just as bilingual infants exhibit equal preferences for both native languages (Bosch & Sebastian-Galles, 1997, 2001).

### Method

**Participants.** Twenty-four (17 male and seven female) 4- to 8-month-old<sup>1</sup> American (mean age = 5.2 months,  $SD = 1.1$ ) and

24 (14 male and 10 female) Turkish infants (mean age = 5.7 months,  $SD = 1.2$ ) were recruited from Cambridge, Massachusetts, and Istanbul and Mardin, Turkey. Across all experiments, every effort was made to ensure that the Turkish and American samples were typical of the community from which they were drawn in terms of race, socioeconomic status, and language. Participants in Turkey were recruited from two private clinics as the parents brought their infants for their routine well-baby visits. Participants came from predominantly Turkish-speaking families (four families were multilingual and used a mixture of Turkish and Russian, English, or Kurdish). The participants were drawn from two different cities in Turkey known to have a range of socioeconomic backgrounds, but no specific information about parental ethnicity, education or socioeconomic status was collected. The U.S. sample was recruited from the greater Cambridge area through public birth records. Participants came from predominantly English-speaking families (six families were multilingual and used a mixture of English and Chinese, Spanish, French, or Hebrew). All infants were healthy and full term and had no history of hearing impairment. A total of nine additional infants (three American and six Turkish) participated but were not included in the final sample due to fussing ( $N = 5$ ), sleeping ( $N = 1$ ), or technical failure ( $N = 3$ ).

**Apparatus and stimuli.** Twelve computer-generated auditory sequences were created from one Bulgarian folk melody (Geisler, 1989). The basic melody consisted of five cycles of three notes each (one long and two short notes), arranged in MIDI and recorded to .aiff format using a melodic instrument (vibraphone) and a percussion instrument (rim shot). Half of the sequences (Western) had an isochronous meter with a long-to-short-note duration ratio of 2:1, whereas the other half (Balkan) had a non-isochronous meter with a long-to-short-note duration ratio of 3:2 (see Figure 1). To maximize infants' interest, we transposed the basic melody to three different pitch levels (249.23 Hz, 392 Hz, and 440 Hz). In addition, to control for the potentially confounding influence of speed (*tempo*), we created two tempos (fast and slow) for each pitch level. All auditory stimuli accompanied the same visual (nonrhythmic) portion of a film (Attenborough, 1991).

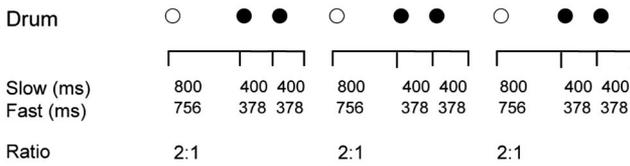
The use of one melodic pattern is common in infant studies of music perception (Plantinga & Trainor, 2005; Trainor & Trehub, 1992; Trehub & Hannon, 2009; Trehub, Thorpe, & Morrongiello, 1987). It is important to note that using the same melody for both meters ensured that any systematic differences in listening time could be attributed only to temporal and not melodic structures.

To confirm that the melody was unfamiliar to both groups of listeners, we asked 26 Turkish and 25 American adult listeners to rate the melody's familiarity on a scale of 1 (*unfamiliar*) to 9 (*highly familiar*). The melody was unfamiliar to North American ( $M = 3.12$ ,  $SE = 0.38$ ) and Turkish ( $M = 3.31$ ,  $SE = 0.36$ ) listeners, and ratings for the two groups did not differ,  $t(49) = 0.355$ ,  $p > .72$ .

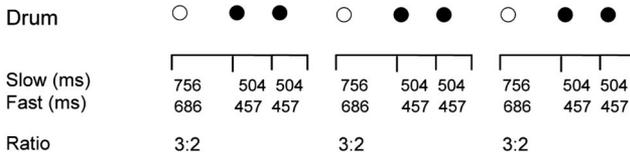
A PowerMac Dual 2 GHz PowerPC G5 computer controlled the presentation of auditory stimuli through a centrally located, hidden loudspeaker (in the U.S., Genelec 8020A; in Turkey, Pridge PR222),

<sup>1</sup> Although infant studies typically use an age range of 1–2 months, the use of a wide age range in the present study enabled us to maximize the number of infants who could be tested on limited visits to Turkey.

Western Meter



Balkan Meter



Arbitrary Meter

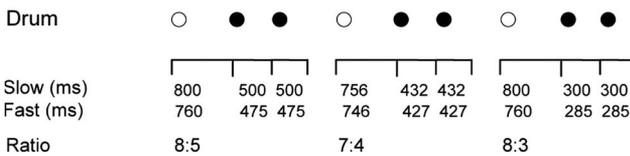


Figure 1. Examples of Western, Balkan and arbitrary meters containing a long-short-short drum pattern. Each type of meter consists of two different tempos (slow and fast), as shown by the two sets of interval durations (in ms) beneath each pattern. The sequence of intervals in the Western-meter drum pattern forms a long-to-short duration ratio of 2:1; the sequence of intervals in the Balkan-meter drum pattern forms a long-to-short duration ratio of 3:2; and the sequence of intervals in the arbitrary-meter drum pattern varies from cycle to cycle, forming highly complex duration ratios of 8:5, 7:4 and 8:3. Open circles signify the downbeat of the cycle, whereas filled circles signify subdivisions of that cycle.

and visual stimuli were presented on a 17-in. (43-cm) color monitor (in the U.S.: Acer, Taipei, Taiwan; in Turkey: Shuttle XP17 LCD, Taipei, Taiwan). Infants' visual fixations were recorded with a Sony DCR-HC32 infrared digital video camera (Tokyo, Japan) located above the monitor and focused on the infant's face.

**Design and procedure.** Testing took place at Harvard University in Cambridge and at two different pediatric clinics in Istanbul and Mardin, Turkey. Each infant was tested on a parent's lap in a dimly lit testing room with one monitor located approximately 50 cm in front of the infant. Parents were discouraged from speaking or intervening during the experiment, and throughout the duration of the experiment they listened to classical music over noise-canceling headphones (Sony MDR-NC6). A flashing red screen preceded each trial to attract infants' attention. During each trial the melodic sequence was repeated up to a maximum of 60 s (seven repetitions) or until the infant looked away from the display for more than 2 s. An observer recorded infants' looking times by pressing a button, using the program Habit X (Version 1.0; Cohen, Atkinson, & Chaput, 2004) to control stimulus presentation. Final looking-time measurements were recorded off-line by a second experimenter (blind to condition), who performed frame-by-frame coding of looks. Each infant was presented with a total of 12 trials,

during which they heard a random ordering of Western and Balkan sequences at every tempo and pitch level, with the constraint that trials always alternated between meters. Starting meter (Western or Balkan first) was counterbalanced between subjects.

Results and Discussion

Looking times across trials were averaged separately for the two meters (Western and Balkan). For American infants, the average looking times were 30.38 s (*SE* = 2.62) for Western-meter melodies and 26.38 s (*SE* = 2.71) for Balkan-meter melodies (see Figure 2A). By contrast, for Turkish infants the average looking

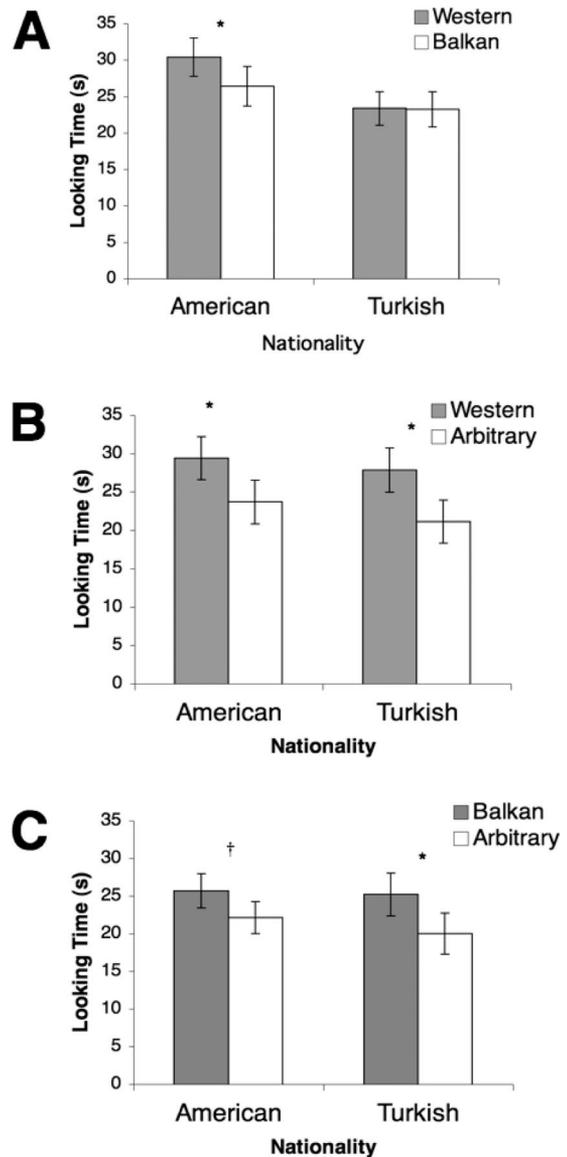


Figure 2. Mean looking times (in seconds) of American and Turkish infants during the presentation of melodies having Western and Balkan meters in Experiment 1 (Figure 2A), Western and arbitrary meters in Experiment 2 (Figure 2B), and Balkan and arbitrary meters in Experiment 3 (Figure 2C). Error bars represent standard errors. \* *p* < .05. † *p* = .074.

times were 23.35 s ( $SE = 2.27$ ) for Western meter and 23.26 s ( $SE = 2.42$ ) for Balkan meter. A mixed-design analysis of variance (ANOVA), with meter (Western vs. Balkan, within subjects), nationality (Turkish vs. American, between subjects), and age (in half-month increments, between subjects), revealed a significant interaction between meter and nationality,  $F(1, 33) = 5.487, p < .05, \eta^2 = .143$ . Planned comparisons indicated that American infants preferred Western to Balkan meters,  $t(23) = 2.156, p < .05, d = 0.307$ , whereas Turkish infants showed no differential responding,  $t(23) = 0.054, p > .95, d = 0.008$ . Because it ranged so widely, age in half-month increments was a factor in the analysis, and we did observe a main effect of age,  $F(8, 33) = 2.498, p < .05, \eta^2 = .37$ , with overall looking times inversely related to age (a common finding in studies using infant looking time; Johnson, 1996). We also observed a significant three-way interaction between meter, age, and nationality,  $F(5, 33) = 2.647, p < .05, \eta^2 = .286$ . Post hoc ANOVAs were conducted separately for each nationality with variables of meter and age; they revealed no main effects or interactions for the Turkish group but a main effect of meter for the American group,  $F(1, 16) = 4.271, p = .05, \eta^2 = .211$ . Although the post hoc analyses revealed no main effects or interactions involving age, a nonsignificant trend was observed among American infants, whose preferences for Western over Balkan meter were largest in the older groups,  $F(7, 16) = 2.13, p = .09, \eta^2 = .48$ .

This result provides the first evidence to date that musical preferences vary depending on infants' cultural background. American infants, who were familiar with only one of the two meters, showed a preference for the familiar meter, whereas Turkish infants, for whom both meters were familiar, showed equal listening times to both meters. This pattern of results closely parallels prior findings with monolingual and bilingual infants, where monolinguals exhibited strong preferences for their native language but bilinguals showed equal preference for both of their native languages (Bosch & Sebastian-Galles, 1997, 2001). Despite these similarities, caution must be taken when interpreting any negative finding. It is possible that Turkish infants were equally uninterested (or interested) in the two familiar meters, or they might lack any type of metrical preference. Experiments 2 and 3 therefore examined whether infants would prefer Western or Balkan meters to a highly unfamiliar, irregular meter.

### Experiment 2: Western and Arbitrary Meters

Both American and Turkish infants were presented with melodies having Western or arbitrary metrical structures. The arbitrary meter was designed to be highly irregular and unfamiliar in any existing musical culture and thus unfamiliar to both groups. We therefore expected infants to prefer the familiar Western meter regardless of their native culture. If, however, the results of Experiment 1 arose from Turkish infants' lack of any metrical preferences, we expected Turkish infants to show no preference in the present experiment.

### Method

**Participants.** Sixteen (eight male and eight female) 4- to 8-month-old American (mean age = 6.3 months,  $SD = 0.7$ ) and 16 (10 male and six female) Turkish infants (mean age = 5.6 months,

$SD = 1.4$ ) were recruited from Cambridge, Massachusetts, and Istanbul and Mardin, Turkey. As in Experiment 1, Turkish infants came from predominantly Turkish-speaking families (six families were multilingual and used a mixture of Turkish and Kurdish); American infants came from predominantly English-speaking families (five families were multilingual and used a mixture of English and Greek, Arabic, Italian, Finnish, or Dutch). All infants were healthy and full term, had no history of hearing impairment, and had not been tested in Experiment 1. A total of five additional infants (two American and three Turkish) participated but were not included in the final sample due to fussing ( $N = 3$ ) or technical failure ( $N = 2$ ).

**Apparatus and stimuli.** The six Western sequences from Experiment 1 were used again. In addition, six sequences with an arbitrary meter were created. These sequences were otherwise identical to the Western and Balkan sequences, but the ratio between long and short durations varied from cycle to cycle and contained highly complex ratios of 7:4, 8:5, and 8:3 (see Figure 1 for the specific sequence of interval ratios). Because these sequences do not resemble any known metrical structure of any musical culture, they were expected to be unfamiliar to both groups of infants. All other aspects of the stimuli and apparatus were identical to Experiment 1.

**Design and procedure.** The design and procedure were identical to Experiment 1.

### Results and Discussion

Looking times across trials were averaged separately for the two meters (Western and arbitrary). For American infants, the average looking times were 29.39 s ( $SE = 2.88$ ) for Western-meter melodies and 23.68 s ( $SE = 2.83$ ) for arbitrary-meter melodies (see Figure 2B). Likewise, for Turkish infants, the average looking times were 27.83 s ( $SE = 2.86$ ) for Western meter and 21.11 s ( $SE = 2.78$ ) for arbitrary meter. A mixed-design ANOVA, with meter (Western vs. arbitrary, within subjects), nationality (Turkish vs. American, between subjects), and age (in half-month increments, between subjects), revealed a significant main effect of meter,  $F(1, 17) = 11.257, p < .01, \eta^2 = .885$ . No other significant main effects or interactions were observed. Planned comparisons confirmed that a preference for Western over arbitrary meters was evident for both American infants,  $t(15) = 3.55, p < .01, d = 0.508$ , and Turkish infants,  $t(15) = 3.604, p < .01, d = 0.596$ . Thus, both Turkish and American infants exhibited a robust listening preference for Western meter when it was paired with a wholly unfamiliar and irregular meter.

### Experiment 3: Balkan and Arbitrary Meters

The final experiment allowed us to further rule out the hypothesis that Turkish infants show no metrical preferences. In addition, it allowed us to examine the influence of regularity on listening preferences, because the Balkan sequence, although unfamiliar to American listeners, is nevertheless far more regular and predictable than is the arbitrary sequence. One hypothesis is that listening preferences are based entirely on familiarity, in which case we would expect Turkish infants to prefer the familiar Balkan meter over the unfamiliar arbitrary meter but American infants to exhibit no preference for two equally unfamiliar meters. An alternative

possibility is that simplicity also plays some role in early listening preferences, regardless of culture. Infants as young as 2 months appear to exhibit robust listening preferences for simplicity of musical pitch structure (i.e., consonance and dissonance; Trainor & Heinmiller, 1998; Trainor et al., 2002; Zentner & Kagan, 1996). For temporal patterning, some evidence also suggests that both infants and adults prefer regular rhythmic sequences to those composed of random intervals (Herry et al., 2007; Nakata & Mitani, 2005), and that infants' detection of subtle disruptions is more accurate in the context of a regular versus highly irregular rhythm (Trehub & Hannon, 2009). Thus, if simplicity and regularity also play a role in listening preferences, we would expect both groups, regardless of familiarity, to show a preference for the relatively simple Balkan sequence over the more complex arbitrary sequence.

## Method

**Participants.** Sixteen (six male and 10 female) 4- to 8-month-old American (mean age = 6.1 months,  $SD = 1.1$ ) and 16 (seven male and nine female) Turkish infants (mean age = 6.2 months,  $SD = 1.3$ ) were recruited from Cambridge, Massachusetts, and Istanbul and Mardin, Turkey. As in Experiments 1 and 2, Turkish infants came from predominantly Turkish-speaking families (four families were multilingual and used a mixture of Turkish and Kurdish) and American infants came from predominantly English-speaking families (five families were multilingual and used a mixture of English and Nepali, Russian, Telugu, French, or Hungarian). All infants were healthy and full term, had no history of hearing impairment, and had not been tested in Experiments 1 or 2.

**Apparatus and stimuli.** In this experiment we used the six Balkan sequences from Experiment 1 and the six arbitrary sequences from Experiment 2. All other aspects of the stimuli and apparatus were identical to Experiments 1 and 2.

**Design and procedure.** The design and procedure were identical to Experiments 1 and 2.

## Results and Discussion

Looking times across trials were averaged separately for the two meters (Balkan and arbitrary). As shown in Figure 2C, for American infants, the average looking times were 25.65 s ( $SE = 2.27$ ) for Balkan meter and 22.05 s ( $SE = 2.13$ ) for arbitrary meter; for Turkish infants, the average looking times were 25.17 s ( $SE = 2.83$ ) for Balkan meter and 20.22 s ( $SE = 2.69$ ) for arbitrary meter. A mixed-design ANOVA, with meter (Balkan vs. arbitrary, within subjects), nationality (Turkish vs. American, between subjects), and age (in half-month increments, between subjects), revealed a significant main effect of meter,  $F(1, 17) = 11.468, p < .01, \eta^2 = .891$ . No other main effects or interactions were observed. Planned comparisons showed that Turkish infants preferred Balkan over arbitrary meters,  $t(15) = 2.43, p < .05, d = 0.448$ , as did American infants, although this effect was nonsignificant,  $t(15) = 1.917, p = .074, d = 0.409$ . The absence of a significant group by meter interaction and the comparable effect sizes ( $d$ ) in both groups suggest that both groups showed a preference for Balkan over arbitrary meter, supporting the notion that both regularity and familiarity contribute to listening preferences.

## General Discussion

Infants find familiar structures appealing, and their early preferences can be influenced by exposure to more than one culture-specific structure. For example, whereas monolingual infants prefer the speech of their native language (Moon et al., 1993), bilingual infants prefer both of their native languages to an unfamiliar language but show no preference when presented with both of their native languages (Bosch & Sebastian-Galles, 1997, 2001). Likewise, infants who live in a racially uniform environment tend to prefer faces of their own race (Kelly et al., 2005), whereas infants who live in multicultural environments with exposure to faces from various races do not exhibit own-race face preferences (Bar-Haim et al., 2006). In combination with prior evidence from speech and face perception, the three present experiments provide further evidence that infants prefer the structures of their native culture. This support comes from the finding that, although both Turkish and American infants exhibit robust preferences for regular meters when paired with highly irregular, unfamiliar meters, only American infants prefer Western over Balkan meters. Turkish infants, by contrast, show no preference when presented with two familiar meters (Experiment 1).

The present findings may appear to contradict prior work showing that young infants' metrical processing is unbiased by their native culture (Hannon & Trehub 2005a), which might predict that infants under 12 months should exhibit no culture-specific listening preferences. The language domain presents a comparable paradox, with young infants exhibiting robust listening preferences for native speech despite being able to discriminate speech sounds from both native and foreign languages (Werker & Tees, 1999). This apparent contradiction underscores the importance of examining both discrimination and preference in infant looking-time studies. It also suggests that infants show attentional and aesthetic biases for native structures even before they exhibit culture-specific discrimination abilities. The present study used a very wide age range but did not have sufficient numbers in each age group to observe developmental changes. Therefore, one goal for future work is to further examine age-related changes in infants' culture-specific preferences and the extent to which such preferences may contribute to culture-specific perceptual reorganization.

The present finding also raises the possibility that early preferences for musical sequences may also be influenced by metrical ratio simplicity. This was evident in Experiment 3, where both American and Turkish infants preferred listening to the Balkan-meter sequence over the arbitrary-meter sequence. If familiarity was the only factor contributing to listening preferences, Balkan and arbitrary meters should have been equally unfamiliar and thus indistinguishable to American infants. Thus, simplicity may have played some role in the preferences observed in Experiments 2 and 3. Nevertheless, preferences for simplicity were clearly overridden by cultural experience in Experiment 1, because Turkish and American infants, both of whom exhibited metrical preferences in other contexts, showed strikingly divergent preferential listening patterns when presented with pairs of Western- and Balkan-meter sequences.

These results have important implications for our understanding of the initial abilities and attentional biases of infants, because they demonstrate that infants' early preferences for structures of their native culture are not restricted to faces or language but can also be

observed in the domain of music. Familiarity clearly has a powerful influence on the allocation of attention early in life, and familiarity preferences may facilitate the acquisition of culture-specific perceptual and cognitive abilities (Hannon & Trehub, 2005b; Pascalis et al., 2002; Sugita, 2008; Werker & Tees, 2005). Preferences for familiarity may also serve important social functions, such as identification of caregivers and enhancement of mother-child bonding. In line with this argument, it has been shown that the auditory preference for native language gives rise to social preferences for individuals who speak that native language, as evidenced by gaze or selective interaction even among prelinguistic infants (Kinzler, Dupoux, & Spelke, 2007). Infants are also selective with respect to social referencing, and in ambiguous situations they tend to prefer familiar adults, such as primary caregivers (Zarbatany & Lamb, 1985). In summary, infants exhibit selective attention to familiar cultural structures across a range of domains that include music, and these biases may play a fundamental role in shaping and modulating infants' basic attentional processes and scaffolding of social relationships early in life.

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